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AFFINITIES OF PHYLLOCLADUS

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In connection with the work on *Phyllocladus alpinus* published in this journal (BOT. GAZETTE 46:339-348. pls. 20-22. 1908), it was the intention not to venture upon a discussion of the relationships until a more complete knowledge of the life-history had been obtained from further material. On account of the probable delay connected with securing and investigating the new material, it seems better to present at this time such conclusions as the results already obtained seem to justify.

In 1872 *Phyllocladus* was placed among the Podocarpaceae by STRASBURGER,¹ the relationship being based upon external resemblances. In ENGLER and PRANTL'S *Pflanzenfamilien* it is put among the Taxineae. In 1903 PILGER² placed it in a separate group (Phyllocladoideae) intermediate between Taxineae and Podocarpaceae; this disposition of the genus being based upon features in which *Phyllocladus* differs from the Taxineae, namely the two-sporangiate microsporophyll, the uniovulate scale, the arillus, and the anatomy of the vegetative structures. Miss ROBERTSON³ follows PILGER in assigning to *Phyllocladus* this intermediate position, with a greater affinity for the Podocarpaceae.

In comparing *Phyllocladus* with the Podocarpaceae and with the Taxineae, its relationship to the former tribe becomes very evident. The principal features of resemblance to Podocarpaceae, in contrast with the corresponding features of Taxineae, may be enumerated as follows:

1. The microsporophyll of *Phyllocladus* bears two abaxial sporangia; the microsporophylls of the Taxineae are all of the peltate type, bearing three to eight sporangia.
2. Each scale of *Phyllocladus* bears one centrally placed ovule; among the Taxineae each scale bears two lateral ovules.
3. The microspores of *Phyllocladus* have wings, and four or five nuclei at the time of shedding; those of the Taxineae have no wings, and only one or two nuclei at the time of shedding.
4. Male prothallial cells are formed in *Phyllocladus* and in all the Podocarpaceae; none occur in the Taxineae.
5. The evanescent prothallial tissue of *Phyllocladus* is similar to that found in the Podocarpaceae.
6. The megaspore membrane is well developed; this membrane is

¹ STRASBURGER, E., Die Coniferen und die Gnetaceen. 1872.

² PILGER, R., Taxaceae. Pflanzenreich, nos. 4, 5. 1903.

³ ROBERTSON, AGNES, Some points in the morphology of *Phyllocladus alpinus*. Annals of Botany 20:259-265. pls. 17, 18. 1906.

present in all the gymnosperms except the Taxineae, among which it is almost entirely eliminated.⁴

The features in which Phyllocladus resembles the Taxineae and differs from the Podocarpaceae are as follows:

1. The ovule is erect; in the Podocarpaceae it is more or less inverted, except in *Dacrydium latifolium*.

2. The cladodes contain centripetal wood, according to Miss ROBERTSON (*l. c.*). WORSDELL⁵ states that centripetal wood is more common among the Taxineae than in any other group of Coniferales; it has been found in the leaf and cotyledon of *Taxus* and *Cephalotaxus*, in the cotyledon of *Torreya*,⁶ and in the stem of *Cephalotaxus koraiana*.⁷

3. The arillus of Phyllocladus originates at the base of the ovule, just as does that of *Taxus*; the so-called epimatium (PILGER, *l. c.*) of Podocarpus arises from the scale. If this epimatium represents the arillus of Phyllocladus and *Taxus*, it differs in origin and form; if it does not represent the arillus, it is a structure not found in those genera.

These comparisons indicate that in number and in importance the features of Phyllocladus in common with those of Podocarpaceae are much greater than those in common with Taxineae. The winged microspores and the multicellular and evanescent prothallial tissue alone would seem to be of sufficient importance to associate Phyllocladus with the Podocarpaceae. We are inclined, therefore, to assign Phyllocladus to the Podocarpaceae, thus confirming STRASBURGER'S conclusion of 1872; and not to regard it as referable to Taxineae, or as worthy of constituting a distinct group.—N. JOHANNA KILDAHL, *The University of Chicago*.

NOTE ON THE POLLEN OF MICROCACHRYS

NORÉN⁸ has recently described certain of the reproductive features of *Saxegothaea*. He found that the microspore, like that of the other podocarps recently described, has supernumerary prothallial cells. Unlike the other forms, however, the grains are not winged. In connection with the

⁴ THOMSON, R. B., The megaspore membrane of the gymnosperms. Univ. Toronto Biol. Series, no. 4. 1905.

⁵ WORSDELL, W. C., On transfusion tissue; its origin and function in the leaves of gymnospermous plants. Trans. Linn. Soc. Bot. London II. 5:301-319. pls. 23-26.

⁶ CHICK, EDITH, The seedling of *Torreya myristica*. New Phytol. 2:83. 1903.

⁷ ROTHERT, W., Ueber parenchymatische Tracheiden und Harzgänge im Mark von *Cephalotaxus*-Arten. Ber. Deutsch. Bot. Gesells. 17:275. 1899.

⁸ NORÉN, C. O., Zur Kenntnis der Entwicklung von *Saxegothaea conspicua* Lindl. Svensk. Bot. Tidskr. 2:101-122. pls. 7-9. 1908.